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A REVIEW OF THE AMERICAN SPECIES OF THE GENUS *SPHYRÆNA*.

BY SETH E. MEEK AND ROBERT G. NEWLAND.

The object of this paper is to give a review of the American species of *Sphyræna*, with detailed descriptions of the four species found on the Atlantic Coasts of America. The specimens examined by us belong, in part, to the Museum of Indiana University; the rest to the U. S. National Museum. All were collected by Professor Jordan at Havana, Cuba; Key West, Fla., and Wood's Holl, Mass.

The two Pacific species have been fully described by Dr. Steindachner (Ichthyol. Beiträge, vii, 1878, 1-4). The remaining species here mentioned, *Sphyræna sphyræna*, we have not seen.

We are under obligations to Professor Jordan, for use of his library and for valuable suggestions.

*Analysis of American species of Sphyræna.*

- a. Scales large, 75 to 85 in lat. line; origin of first dorsal behind root of ventrals, over last third or fourth of pectorals; body compressed; lower jaw with fleshy tip; maxillary reaching past front of orbit; teeth large. *picuda*. 1.
- aa. Scales moderate, 110 to 130 in lat. line; body subterete.
  - b. Pectorals reaching the front of spinous dorsal; maxillary reaching front of orbit; origin of spinous dorsal behind root of ventrals.
    - c. Lower jaw with fleshy tip; teeth very strong; scales in lat. line 110. *ensis*. 2.
    - cc. Lower jaw without fleshy tip; teeth strong; lat. line 130. *guaguanche*. 3.
  - bb. Pectorals not reaching front of first dorsal; maxillary not reaching front of orbit.
    - d. Eye large; teeth small; interorbital area convex; median ridge of frontal groove not well developed. *picudilla*. 4.
    - dd. Eye small; teeth larger; interorbital space flattish; median ridge of frontal groove prominent. *borealis*. 5.

*aaa.* Scales very small, 150 to 170 in lat. line; origin of spinous dorsal well behind tip of pectorals, before the vertical from root of ventrals; lower jaw with fleshy tip.

*e.* Body very slender, depth 9 or 10 in length; scales in lat. line 150. *sphyræna.* 6.

*ee.* Body less slender; depth  $7\frac{1}{2}$  in length; scales in lat. line 160 to 170. *argentea.* 7.

1. *Sphyræna picuda* (Bloch and Schneider) Poey. *Great Barracuda: Picuda.*

*Umbra minor marina* (the Barracuda) Catesby, Fishes Carolina, etc., 1731, tab. i.

*Picuda* Parra, Peces y Crustaceos de Cuba, 1787, 90, tab. 35, f. 2.

*Sphyræna sphyræna*, var. *picuda*, Bloch and Schneider, Systema Ichth., 1801, 110 (after Parra).

*Sphyræna picuda* Poey, Memorias Cuba, ii, 1860, 164 (Havana); Gunt'her, Cat. Fish. Brit. Mus., ii, 1860, 336 (San Domingo, Puerto Cabello, Jamaica, West Indies, River Niger); Poey, Proc. Ac. Nat. Sci. Phila., 1863, 179, 187 (identification of Parra's figure); Poey, Syn. Pisc. Cub., 1868, 359 (Havana); Poey, Enum. Pisc. Cub., 1875, 95 (Havana); Goode, Bull. U. S. Nat. Mus., v, 1876, 62 (Bermudas); Goode and Bean, Proc. U. S. Nat. Mus., i, 1878, 381 (name only); Goode, Proc. U. S. Nat. Mus., ii, 1879, 116 (South Florida); Goode and Bean, Proc. U. S. Nat. Mus., ii, 1879, 342 (West Florida, no description); Goode and Bean, Proc. U. S. Nat. Mus., ii, 1879, 146 (Cuba, Bermudas, W. Fla. and S. Fla.); Poey, Anal. Soc. Hist. Nat. Esp., 1881, 210 (Puerto Rico); Goode and Bean, Proc. U. S. Nat. Mus., v, 1882, 239 (Gulf of Mexico, no description); Jordan and Gilbert, Proc. U. S. Nat. Mus., v, 1882, 589 (Charleston, S. C.); Swain, Proc. Ac. Nat. Sci. Phila., 1882, 307 (identification of *Esox barracuda*, Shaw); Jordan and Gilbert, Bull. U. S. Nat. Mus., 16, 1882, 412 (West Indies).

? *Sphyræna becuna* Lacépède, Hist. Nat. Poiss., v, Pl. 9, f. 3, 1803, from a drawing by Plumier made at Martinique); ? Cuv. and Val., Hist. Nat. Poiss., iii, 1829, 340 (after Lacépède); Guichenot, Ramon de la Sagra, Hist. Cuba (Havana); Poey, Memorias Cuba, ii, 1860, 164 (Havana); Poey, op. cit., ii, 1860, 398 (identification with *S. picuda*; species repudianda).

*Esox barracuda* Shaw, Gen. Zool., v, 1804, 105 (based on Catesby).

*Sphyræna barracuda* Cuv. and Val., op. cit., iii, 1829, 343 (Brazil); Poey, Memorias Cuba, ii, 1860, 398 (species repudianda); Cope, Trans. Am. Phil. Soc. Phila., 1871, 472 (St. Martins).

*Habitat.*—West Indies and Brazil; north to Pensacola, Charleston and the Bermudas.

Head 3 in length; depth 2 in head. D. V-1, 9; A. I-9.

Scales 10-75 to 85-10 (the cross series counted from lateral line to front of dorsal and anal fins respectively).

Body oblong, slightly compressed, covered with large scales. Head large, maxillary large, nearly  $\frac{1}{2}$  length of head, its posterior margin reaching past front of orbit. Lower jaw, with fleshy tip, bluntly conical. Eye rather small, about 6 in head, equals width of interorbital area. Interorbital area concave, with a shallow median groove (as wide a pupil, at posterior edge of orbit), divided by a ridge in front and behind. Supraocular ridge bony and striate. Preocular ridge present.

Teeth large; premaxillary teeth small, little compressed, irregularly set, nearly uniform in size, somewhat thicker and shorter posteriorly; premaxillary with two pairs of very large compressed teeth, their length more than half width of pupil; anterior ones directed downwards, posterior ones downwards and backwards; teeth in lateral series of lower jaw small anteriorly, increasing gradually backwards, when they nearly equal those on palatines; palatine teeth similar to those on lower jaw, arranged in reversed order.

Distance from tip of snout to front of first dorsal  $2\frac{2}{7}$  in body; second dorsal spine longest,  $1\frac{1}{3}$  in snout; second dorsal and anal equal; anal inserted under first third of soft dorsal; caudal forked, upper lobe the longest; pectorals reaching beyond front of dorsal,  $2\frac{1}{2}$  in head; origin of first dorsal slightly behind the ventrals; cheeks and opercles scaly, about twelve rows of scales on cheeks; upper part of head with small imbedded scales.

Color silvery, darker above; sides in young with about ten dark blotches, which break up and disappear with age. Some inky spots, usually on posterior part of body, are very conspicuous in both old and young specimens. Soft dorsal, anal and ventral fins black, except on margins. Pectorals plain, except upper part of its margin, which is black. Fins of very young specimens nearly plain.

This description is made from an examination of some forty specimens, varying in length from two and three-fourths inches to twenty-eight inches. Nearly all were collected by Professor Jordan, at Key West, Florida; a few at Havana, Cuba.

This appears to be the largest of the Barracudas, reaching a length of at least five or six feet. Its mouth is larger and armed with larger teeth than in any other of our species.

Below is given a table of measurements of six specimens from Key West. The proportions are given in hundredths of the length from tip of snout to end of last vertebra.

Extreme length of fish, in inches,	14.75	10.5	7.5	4.125	4.1	2.6
Length of fish from end of snout to last caudal vertebra, in inches,	12.5	8.5	6.2	3.5	3.5	2.3
Greatest depth of body (hundredths of above),	16.	16.	16.	16.	14.	10.
Length of head,	30.5	33.5	34.	37.	36.	36.
Diameter of eye,	5.	6.	6.5	7.	6.5	7.
Length of maxillary,	14.5	16.	15.	15.5	15.	14.5
Width of interorbital area,	5.5	5.	4.5	4.75	5.	5.
With of base of pectorals,	3.5	3.25	3.	3.	2.25	3.
Length of pectorals,	11.5	11.5	11.	11.	11.	10.25
Distance from end of snout, to origin of spinous dorsal,	42.5	44.	45.	49.	49.	53.
Distance from end of snout to root of ventrals,	38.	41.5	42.	44.	48.	53.
Distance between dorsal fins,	20.	19.	18.	16.	18.	23.

2. *Sphyræna ensis* Jordan and Gilbert.

*Sphyræna forsteri* Steindachner, Ichth. Beiträge vii, 1878, 4 [Cape San Lucas to Monterey (not of Cuv. and Val., an East Indian species, as yet not certainly recognized)].

*Sphyræna ensis* Jordan and Gilbert, Bull. U. S. Fish Comm., 1882, 106 (Mazatlan); Jordan and Gilbert, op. cit., ii, 1882, 109 (Panama, no description); Jordan and Gilbert, Proc. U. S. Nat. Mus., v, 1882, 624 (Panama; no description).

*Habitat*.—Pacific Coast of America from Cape San Lucas to Panama (East Indies?).

3. *Sphyræna guaguanchæ* Cuv. and Val. *Guaguanchæ*: *Guaguanchæ Pelon*.

*Sphyræna guachancho* Cuv. and Val., Hist. Nat. Poiss., iii, 1829, 342 (Havana; on a drawing by Poey; lapsus for *guaguanchæ*); Guichenot, Ramon de la Sagra, Hist. Cuba, 165 (Havana).

*Sphyræna guaguanchæ* Poey, Memorias Cuba, ii, 1860, 166 (Havana); Poey, Enum. Pisc. Cub., 1875, 96 (Havana).

*Sphyræna guaguanchæ* Goode and Bean, Proc. U. S. Nat. Mus., ii, 1879, 146 (Wood's Holl, Mass.; Pensacola, Fla.; Cuba); Goode and Bean, Proc. U. S. Nat. Mus., v, 1882, 239 (Gulf of Mexico; no description); Jordan and Gilbert, Synopsis Fish. N. A., 1883, 411; Jordan, Proc. U. S. Nat. Mus., 1884 (Pensacola, Fla.).

? *Sphyræna güntheri* Haly, Ann. Mag. Nat. Hist., ser. iv, vol. xv, p. 270 (Colon; fide Steind.); Steindachner, Ichthyol. Beiträge, vii, 1878, 6 (after Haly).

*Habitat*.—West Indies, north to Wood's Holl, Mass., and Pensacola, Florida.

Head  $3\frac{1}{4}$  in length; depth 2 in head, D. V-1, 9; A. I-8; scales in lateral line 120 to 130.

Body rather slender, subterete, covered with moderate-sized scales; head large; maxillary small, less than  $\frac{1}{2}$  head, scarcely reaching orbit; lower jaw bluntly conical, without fleshy tip; Eye rather large,  $5\frac{1}{2}$  in head, a little exceeding interorbital area; interorbital area flat; median groove very shallow, the median longitudinal ridge very small, anterior; supraocular ridge bony, striate; preocular ridge large.

Premaxillary teeth small, 35-40 in number; premaxillary teeth present; anterior palatine teeth larger and more compressed than those on premaxillary, widely set, decreasing in length gradually; teeth in lateral series of lower jaw small and closely-set anteriorly, larger and wide-set posteriorly, about 10 in number; a large compressed tooth at symphysis.

Origin of first dorsal over above tip of pectoral, slightly behind the ventrals; distance between dorsals  $5\frac{1}{2}$  in body; distance from tip of snout to spinous dorsal  $2\frac{1}{2}$  in body; scales moderate, almost uniform in size; cheeks and opercles scaly; upper part of head with small imbedded scales.

Color light olive, yellowish on soft dorsal; anal and ventral tips of caudal rays black; top of head dark; dark punctulations on upper part of body; spinous dorsal with some dark punctulations.

The description of this species is taken from three specimens from Havana, Cuba, varying in length from six and one-half to eight inches, and from one specimen collected by Mr. Stearns, from Pensacola, Fla., nineteen inches in length.

Below is given a table of measurements of specimens we have examined. The proportions are given in hundredths of length from tip of snout to the end of last vertebra.

	Pensacola, Fla.	Havana, Cuba.		
Extreme length in inches, . . . . .	19.	7.5	6.75	6.5
Length of fish from end of snout to last caudal vertebra in inches, . . . . .	15.75	6.12	5.5	4.9
Greatest depth of body (hundredths of length), . . . . .	16.5	17.	14.75	14.
Length of head, . . . . .	30.	35.	32.	33.
Diameter of eye, . . . . .	5.	6.	6.	6.
Length of maxillary, . . . . .	15.5	15.	14.5	15.
Width of interorbital area, . . . . .	4.5	5.	5.	5.
Width of base of pectorals, . . . . .	2.5	3.	3.	3.
Length of pectorals, . . . . .	....	13.	13.	12.
Distance from origin of spinous dorsal to end of snout, . . . . .	42.5	46.	44.5	47.
Distance from end of snout to root of ventrals, . . . . .	38.5	43.	40.5	42.
Distance between dorsal fins, . . . . .	20.	19.	17.	18.5

We have not seen the original description of *Sphyræna güntneri* Haly, from Colon (Aspinwall). The abridged description given by Steindachner agrees fully with *S. guaguanche*. We follow Poey in restoring the correct orthography of the name, *Guaguanche*.

4. *Sphyræna picudilla* Poey. *Picudilla*.

*Sphyræna barracuda* Guichenot, Ramon de la Sagra, Hist. Cuba, 165 (Cuba; fide Poey).

*Sphyræna picudilla* Poey, Memorias Cuba, ii, 1860, 162, 163, 398 (Havana); Poey, Syn. Pisc. Cuba, 1868, 359 (Havana); Poey, Enum. Pisc. Cub., 1875, 96 (Havana).

*Habitat*.—Coasts of Cuba.

Head  $3\frac{1}{8}$  in body; depth  $2\frac{1}{4}$  in head, D. V-1, 9; A. I-9; scales in lateral line 110.

Body rather robust, subterete, covered with scales of moderate size; head rather large; maxillary rather small, about  $2\frac{2}{3}$  in head, not reaching orbit.

Jaw with fleshy tip, bluntly conical; eye large, about 5 in head,  $1\frac{1}{2}$  times interorbital space; interorbital area flattish; median groove shallow, divided by a very indistinct median ridge; supraocular ridge bony, striate; preocular ridge rather prominent.

Premaxillary teeth small, subconical; dentition as in *Sphyræna borealis*, but slightly weaker; position of spinous dorsal, in comparison to ventrals, variable; distance from tip of snout to origin of spinous dorsal about  $2\frac{1}{10}$  in body; pectorals not reaching spinous dorsal; space separating dorsals about  $5\frac{1}{2}$  in body; second dorsal equal to and somewhat in advance of anal; cheeks and opercles scaly; small imbedded scales on upper part of head; scales on body moderate, uniform in size. Color light olive, darker above; soft dorsal, anal and ventral fins yellowish; spinous dorsal and pectorals darker; upper parts of preopercle and opercle each with a dark spot; top of head and tip of snout blackish.

*S. picudilla* is very closely allied to *S. borealis*. Its eye is, however, much larger (when specimens similar in size are compared), and the frontal groove is somewhat different.

The description of this species is taken from four specimens collected by Professor Jordan in Havana, Cuba.

Below is given a table of measurements of the specimens we have examined. The proportions are given in hundredths of the length from the tip of snout to end of last vertebra.

	Havana, Cuba.			
Extreme length of fish in inches, . . . . .	11.75	11.5	11.25	9.5
Length of fish from end of snout to last caudal vertebra in inches, . . . . .	9.85	9.66	9.4	7.85
Greatest depth of body (hundredths of length), . . . . .	14.	14.50	14.25	14.
Length of head, . . . . .	32.5	31.	32.	32.25
Diameter of eye, . . . . .	6.25	6.	6.	6.75
Length of maxillary, . . . . .	12.25	12.	12.	12.
Width of interorbital area, . . . . .	4.5	4.5	4.5	4.5
Width of base of pectorals, . . . . .	3.	3.	3.	3.
Length of pectorals, . . . . .	10.	9.5	9.	9.
Distance from end of snout to origin of spinous dorsal, . . . . .	47.	47.	47.	46.25
Distance from end of snout to root of ventrals, . . . . .	47.	47.	48.	46.
Distance between dorsal fins, . . . . .	17.25	17.50	17.75	17.25

5. *Sphyræna borealis* De Kay. *Northern Barracuda.*

*Sphyræna borealis* De Kay, N. Y. Fauna, Fishes, 1842, 37, pl. 60, f. 196 (New York); Storer, Synopsis Fish. N. A., 1846 (48); Baird, Ninth Smithsonian Rept., 1854, 12 (Beasley's Point, N. J.); Gill, Rep. U. S. Fish Com., 1872, 808 (no description); Jordan and Gilbert, Proc. U. S. Nat. Mus., i, 1878, 381 (Beaufort, N. C., no description); Goode and Bean, Proc. U. S. Nat. Mus., ii, 1879, 146 (Wood's Holl, Mass.); Bean, Proc. U. S. Nat. Mus., iii, 1880, 102 (Wood's Holl, Mass., no description).

*Sphyræna spet* Jordan and Gilbert, Proc. U. S. Nat. Mus., i, 1878, 381 (Wood's Holl, Mass.); Jordan and Gilbert, Synopsis Fish. N. A., 1883, 411 (in part; not of Lacépède).

*Habitat.* — Atlantic Coast of U. S. from Cape Cod to North Carolina.

Head 3 in length; depth  $2\frac{3}{8}$ ; D. V-1, 9; A. I-9; scales in lateral line 115-130.

Body rather slender, subterete, covered with moderate-sized scales; head large, maxillary small, less than  $\frac{1}{2}$  head, not reaching front of orbit by  $\frac{1}{2}$  diameter of eye; lower jaw with fleshy tip, bluntly conical; eye rather small, about 6 in head, scarcely exceeding width of interorbital area; interorbital area convex; median groove very shallow, divided by a distinct longitudinal ridge, especially well-defined immediately before nostrils; supra-ocular ridge striate; preocular ridge moderate.

Premaxillary teeth small, about 40 in number; front of premaxillary with two pairs of large teeth (sometimes accom-



panied by smaller ones), canine-like ; anterior smallest, directed downwards, posterior ones downwards and backwards ; anterior palatines larger than premaxillary teeth, and more compressed and widely-set ; posterior ones small and closely-set ; order of teeth on lower jaw reversed, but similar to those on the palatines, and smaller, about 10 in series ; large tooth near tip of lower jaw present.

Origin of dorsal over or slightly in advance of ventrals, well behind point of pectorals ; distance between dorsal fins  $5\frac{1}{4}$  in length of body ; distance from tip of snout to spinous dorsal  $2\frac{1}{10}$  in body ; scales moderate, somewhat larger behind soft dorsal and anal ; cheeks and opercles scaly ; small imbedded scales on upper parts of head.

Color olivaceous, silvery below ; young with dusky blotches across the back and along the lateral line.

This description is made from eight specimens collected by Professor Jordan at Wood's Holl, Mass., which vary in length from six and one-fourth to eight and one-half inches. The species does not appear to reach a length of much more than a foot. This species shows several points of similarity to *Sphyræna sphyræna*. It is, however, unlikely that the two are specifically identical.

Below is given a table of four specimens. The proportions are given in hundredths of length from tip of snout to end of last vertebra.

	Wood's Holl.			
Extreme length of fish in inches, . . . . .	6.5			
Length of fish from end of snout to last caudal vertebra in inches, . . . . .	5.5	5.5	5.2	5.3
Greatest depth of body (hundredths of length),	13.	12.	13.	12.
Length of head, . . . . .	34.	33.5	32.	35.
Diameter of eye, . . . . .	5.	6.	5.5	6.
Length of maxillary, . . . . .	14.5	13.75	12.5	15.
Width of interorbital area, . . . . .	4.5	5.	4.	5.
Distance from end of snout to origin of spinous dorsal, . . . . .	47.5	49.	46.	49.
Distance from end of snout to root of ventrals,	48.	49.	46.	49.

6. *Sphyræna sphyræna* (Linnæus) Bloch. *Spet. Barracuda. Sennet.*

*Sphyræna et Sudis auctororum* Artedi, Gen. Pisc., 1738, 84 (Coasts of Italy).

*Esox dorso dipterygio* Linnæus, Mus. Ad. Fried., ii, 1754, 100.

*Esox sphyræna* Linnæus, Syst. Nat., Ed. 10, i, 1758, 313; Ed. 12, i, 1766, 515 (based on Artedi); Gmelin, Syst. Nat., i, 1788, 1389.

- Sphyræna sphyræna* Bloch, Ichth., 1797, taf. ccelxxxix; Schneider, Bloch, Syst. Ichth., 1801, 109; Risso, Ichth. Nice, 1810, 332 (Nice).  
*Esox spet* Haüy, Encyclopédie Methodique, iii, Poissons, 1787.  
*Sphyræna spet* Lacépède, Hist. Nat. Poiss., v, 1803, 326-8; Bonaparte, Iconografia della Fauna Italica, iii, Pesci plate with part 152 (Mediterranean); Goode, Bull. U. S. Nat. Mus., v, 1876, 61 (Bermudas).  
*Sphyræna vulgaris* Cuv. and Val., Hist. Nat. Poiss., iii, 1829, 327 (Mediterranean); Günther, Cat. Fishes Brit. Mus., ii, 1861, 334 (Mediterranean and Lanzarote); Günther, Shore Fishes, Challenger, 1880, 3 (St. Jago); no description.  
*Sphyræna viridensis* Cuv. and Val., op. cit., iii, 1829, 339 (St. Jago, Cape Verde Islands).

*Habitat.*—Coasts of Southern Europe and Northern Africa. Islands of Atlantic (Cape Verde; Madeiras; Bermudas).

7. *Sphyræna argentea* Girard. *California Barracuda.*

- Sphyræna argentea* Girard, Proc. Ac. Nat. Sci. Phila., vii, 1854, 144 (San Diego); Girard, Pac. R. R. Survey, 1859, 59, pl. xiv, 1 (San Diego); Günther, Cat. Fish. Brit. Mus., 1860, 338 (San Diego); Steindachner, Ichthol. Beiträge, vii, 1 (Cape San Lucas to Monterey); Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, iii, 29 (San Diego); Jordan and Gilbert, op. cit., 1880, iii, 456 (San Francisco, Monterey, Santa Barbara, San Pedro and San Diego; no description); Jordan and Jouy, op. cit., iv, 1881, 13 (San Pedro and Santa Barbara); Jordan and Gilbert, op. cit., iv, 1881, 44 (Monterey to Santa Barbara); Jordan and Gilbert, op. cit., v, 1882, 358 (identification of *Sphyræna lucasana* Gill; Cape San Lucas).  
*Sphyræna lucasana* Gill, Proc. Ac. Nat. Sci. Phila., 1863, 86 (Cape San Lucas).

*Habitat.*—Pacific Coast of America from San Francisco to Cape San Lucas.

This species reaches a length of about three feet. We are not able to positively distinguish this species from the published accounts of *S. sphyræna*. We have, however, no doubt that differences will appear on the actual comparison of specimens.